

CLAIMS

What is claimed is:

1. An isolated bacteriophage which is lytic for *Methylobacterium* species, Human
5 blood bacterium (HBB), or both.
2. The bacteriophage of claim 1, wherein the bacteriophage is present in ATCC#
PTA-5075.
- 10 3. The bacteriophage of claim 1, wherein the bacteriophage is lytic for human
blood bacterium (HBB).
4. The bacteriophage of claim 1 wherein the bacteriophage is lytic for Pink
Pigmented Faculatative Methylophages (PPFM).
- 15 5. The bacteriophage of claim 4 wherein the PPFM is selected from the group
consisting of *M. mesophilicum*, *M. organophilum* and *M. extorquens* or combinations
thereof.
- 20 6. The bacteriophage of claim 1 wherein the bacteriophage is the progeny,
derivative recombinant form, or recombinant mutated form of the bacteriophage present
in ATCC# PTA-5057
- 25 7. A method for purifying a bacteriophage which is lytic for *Methylobacterium*
species comprising the steps of:
 - a) obtaining bacteriophage from a sample that has been in contact with plant matter;
 - b) plating the bacteriophage onto a medium comprising at least one *Methylobacterium*
species derived from a plant or seeds of a plant;
 - c) collecting plaques formed in the *Methylobacterium*-containing medium; and

d) purifying the isolated plaques.

8. The method of claim 7 wherein steps b-d are repeated with the product of step (d) until a virulent bacteriophage preparation is obtained.

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9. The method of claim 7 wherein the *Methylobacterium* species is a PPFM.

10. The method of claim 7 wherein the PPFM is selected from the group consisting of *M. mesophilicum*, *M. organophilum* and *M. extorquens* or combinations thereof

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11. A method for purifying a bacteriophage which is lytic for HBB, comprising the steps of:

a) obtaining bacteriophage from a human blood sample;

b) plating the bacteriophage onto a medium comprising HBB;

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c) collecting plaques formed in the HBB-containing medium; and

d) purifying the isolated plaques.

12. The method of claim 11 wherein steps b-d are repeated with the product of step (d) until a virulent bacteriophage preparation is obtained.

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13. A method of removing *Methylobacterium* from plants and seeds of plants, comprising contacting a plant or seed of a plant with a bacteriophage which is lytic for species of the genus *Methylobacterium*, in an amount effective to significantly reduce, or eliminate the *Methylobacterium* from the plant or seeds of the plant.

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14. The method of claim 13 wherein the bacteriophage is present in ATCC# PTA-5075.

15. The method of claim 13 wherein the *Methylobacterium* is PPFM.

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16. The method of claim 15, wherein the PPFM is selected from the group consisting of *M. mesophilicum*, *M. organophilum* and *M. extorquens*.
17. A method of producing male sterility in plants comprising contacting at least a portion of the plant or seeds of the plant with a bacteriophage which is lytic for species of the genus *Methylobacterium* in an amount effective to sterilize the plant or seeds of the plant.
18. The method of claim 17 wherein the bacteriophage is selected from ATCC# PTA-5075
19. The method of claim 17 wherein the *Methylobacterium* is PPFM.
20. The method of claim 19, wherein the PPFM is selected from the group consisting of *M. mesophilicum*, *M. organophilum* and *M. extorquens*.
21. The method of claim 17 wherein the effective amount of bacteriophage is about 10^4 to 10^6 pfu per mL.
22. A method of obtaining hybrid seeds of a plant comprising:
- (a) producing male sterility in a plant by contacting at least a portion of the plant with a bacteriophage which is lytic for species of the genus *Methylobacterium* in an amount effective to sterilize the plant;
 - (b) pollinating a flower from the male-sterile plant with pollen from a source of interest; and
 - (c) collecting hybrid seeds from the plant.
23. A formulation for removing *Methylobacterium* from a plant or seeds of a plant comprising a bacteriophage lytic for at least one *Methylobacterium* species and a

carrier, diluent or dispersant, wherein the bacteriophage is present in an amount sufficient significantly reduce or eliminate *Methylobacterium* from the plant or seeds of the plant.

5 24. The formulation of claim 23 wherein the amount of bacteriophage in the formulation is about 10^4 to 10^6 pfu per mL.

25. A method for treating an HBB or *Methylobacterium* infection in a patient comprising, administering to the patient a therapeutically effective amount of a
10 bacteriophage which is lytic for HBB, *Methylobacterium*, or both.

26. The method of claim 25 wherein the bacteriophage is selected from ATCC# PTA-5075.

15 27. The method of claim 25 wherein the infection is an HBB infection.

28. The method of claim 25 further comprising administering a therapeutically effective amount of at least one antibiotic.

20 29. The method of claim 28 wherein the antibiotic is selected from the group consisting of beta-lactam antibiotics, aminoglycoside antibiotics, and tetracycline antibiotics.

30. A method for treating an autoimmune disease in a patient comprising,
25 administering to the patient a therapeutically effective amount of a bacteriophage which is lytic for HBB, wherein the autoimmune disease is associated with elevated levels of HBB in the patient.

31. The method of claim 30 wherein the bacteriophage is selected from ATCC #
30 PTA-5075.

32. The method of claim 30 wherein the autoimmune disease is selected from the group consisting of multiple sclerosis (MS), chronic fatigue syndrome, lupus erythematosus, rheumatoid arthritis and fibromyalgia.
- 5 33. The method of claim 30, wherein the autoimmune disease is multiple sclerosis.
34. The method of claim 30 further comprising administering a therapeutically effective amount of at least one antibiotic.
- 10 35. The method of claim 34 wherein the antibiotic is selected from the group consisting of beta lactam antibiotics, aminoglycoside antibiotics, and tetracycline antibiotics.
- 15 36. A pharmaceutical composition comprising a therapeutically effective amount of bacteriophage which is lytic for *Methylobacterium* species, HBB, or both, and a pharmaceutically acceptable carrier.
- 20 37. The pharmaceutical composition of claim 36, wherein the bacteriophage is selected from ATCC# PTA-5075.
38. The pharmaceutical composition of claim 36, further comprising an antibiotic.
39. The pharmaceutical composition of claim 36 wherein the bacteriophage is present at a titer of approximately 10^2 - 10^{11} PFU/ml or PFU/g.
- 25 40. The pharmaceutical composition of claim 36 wherein the bacteriophage is present at a titer of approximately 10^7 - 10^{11} PFU/ml or PFU/g.

41. A method of disinfecting an environmental surface contaminated with *Methylobacterium* or HBB, comprising contacting the environmental surface with a disinfecting amount of a bacteriophage which is lytic for *Methylobacterium*, HBB or both.
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42. The method of claim 41 wherein the bacteriophage is selected from ATCC# PTA-5075
43. The method of claim 41 wherein the bacterium is PPFM or HBB.
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44. A method for preventing a susceptible article from becoming contaminated with HBB or *Methylobacterium*, comprising contacting the article with a disinfecting amount of a bacteriophage which is lytic for HBB, *Methylobacterium* or both.
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45. The method of claim 44 wherein the bacteriophage is selected from ATCC# PTA-5075
46. The method of claim 44 wherein the bacteriophage are contacted with an environmental surface using a wipe comprising the bacteriophage.
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47. A composition for disinfecting an article contaminated with HBB or *Methylobacterium* comprising a disinfecting amount of a bacteriophage which is lytic for HBB, *Methylobacterium*, or both and a carrier, diluent or dispersant.
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48. The method of claim 47 wherein the bacteriophage is selected from ATCC# PTA-5075.
49. A kit for applying a bacteriophage lytic for HBB or *Methylobacterium* to an article or plant comprising, the bacteriophage and a suitable carrier, diluent or

dispersant in a container and a mechanism for dispensing the bacteriophage from the container.

50. A kit for applying a bacteriophage lytic for HBB or *Methylobacterium* to an
5 article or plant comprising a freeze dried bacteriophage in a first container; a suitable
phage carrier diluent or dispersant in a second container; and a mechanism for
dispensing the bacteriophage.

51. The kit of claim 49 wherein the mechanism for dispensing the bacteriophage is a
10 sprayer.

52. The kit of claim 49 wherein the mechanism for dispensing is a wipe.

53. The use of a composition comprising a bacteriophage lytic for HBB in the
15 manufacture of a medicament for treating an HBB infection in a patient.

54. The use of claim 53 wherein the bacteriophage is selected from ATCC# PTA-
5075.

20 55. A composition for use in therapy comprising a bacteriophage lytic for HBB.

56. The composition of claim 55 wherein the bacteriophage is selected from ATCC#
PTA-5075.